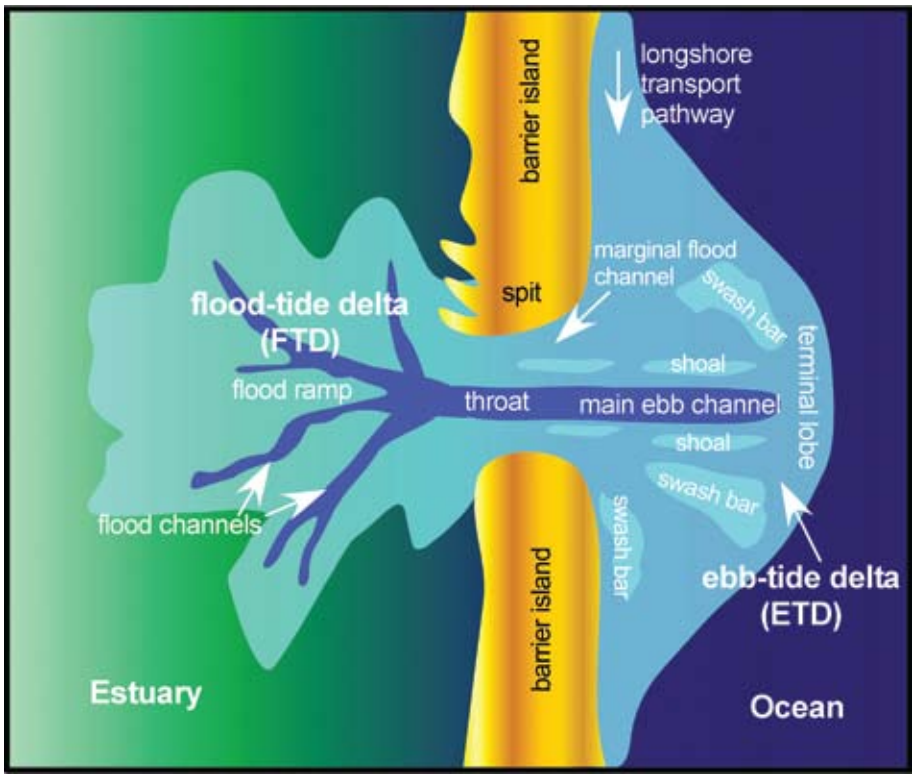

Figure 2. Cartoon showing the generalized morphology and terminology of features associated with inlets.

inlet during flood tides, it is moved into the marginal flood channels and is deposited on the flood-tide delta (FTD) (Fig. 2). As the tide ebbs, sediment is transported seaward through the main ebb channel to be deposited on the ebb-tide delta (ETD). The ETD sand is reworked by waves and currents into shoals, which migrate across the ETD platform and merge with the beach down-current of the inlet. In this manner, both the FTD and ETD temporarily store and episodically release sand to the nearby beaches and coastal system.

The location of the main ebb channel also plays a fundamental role in erosion and deposition around an inlet. The main ebb channel may shift its location during storms. If the channel intersects the island on one side of the inlet, rapid erosion of the island shoreline may ensue. At the same time, sand that was originally deposited on the ETD on the up-current side of the ebb channel may now be on the down-current side, and may naturally nourish the beach on the adjacent island.

The shape and size of the inlet, the FTD, and the ETD depend upon the amount of sand moving along the coast, the wave energy and the tidal range. Depending on the angle of wave approach, and the volume of sand moving along the shore, the up-current side of the inlet may accrete sand, building a spit, while the down-current side erodes. The net consequence of this process on the Outer Banks is southward inlet migration.

An important point is that the natural transport and deposition of sand within an inlet environment and the adjacent beaches is in equilibrium with the natural coastal dynamics. Any interruption of the natural sand transport across an inlet, either by dredging and enlarging the channels, mining sand from the ETD, or by installing terminal jetties, will increase shoreline erosion on the down-current side of the inlet.

Flood-tide delta and channel-fill sediments of the inlet throat are commonly preserved beneath transgressive barrier islands and are important components of island evolution during transgression (Godfrey and Godfrey, 1976; Herbert, 1978; Heron and others, 1984; Inman and Dolan, 1989; Riggs and Ames, 2003; Culver and others, 2006). Following inlet closure, shallow FTD deposits may become marshes that serve as a shallow water platform where storm-driven island overwash processes deposit large lobes of sand, thus building island elevation (Godfrey and Godfrey, 1976; Riggs and Ames, in press). FTD shoals may also be reworked and incorporated into the back-barrier shorezone, thereby increasing island width and elevation (Riggs and Ames, 2003; Culver et al., 2006; Smith et al., 2008; Riggs and Ames, in press) (Figs. 3 and 4).